WHAT IS CLAIMED IS:

1. A deposition method of forming a silicon inorganic insulating film on a substrate, comprising the steps of:

placing a substrate in a semiconductor manufacturing apparatus having parallel plate type electrodes; and

depositing fluorine-containing silicon insulating film on the substrate by generating plasma of process gas containing SiH_4, SiF_4 and an oxygen source substance.

2. The deposition method according to claim 1 further comprising the step of:

introducing the process gas containing SiH_4, SiF_4 and oxygen source substance into a chamber.

3. The deposition method according to claim 1 wherein the RF power applied to said parallel plate type electrodes is 1000 Watts or more.

4. The deposition method according to claim 1 wherein the RF power applied to said parallel plate type electrodes is 1400 Watts or more.

5. The deposition method according to claim 1, wherein said oxygen source substance includes at least one substance of N_20, NO, N_20_3, N_20_5, NO_3, N_20_4 and NO_2.

6. The deposition method according to claim 1, wherein said oxygen source substance includes at least one substance of 02 and 03.

7. The deposition method according to claim 1, wherein said oxygen source substance includes at least one substance of CO, CO_2 and H_20.

8. The deposition method according to claim 1, wherein the RF power applied to said parallel plate type electrodes is at least 4 Watts/sccm.

9. The deposition method according to claim 1, wherein the flow rate ratio of

said SiF_4 to said SiH_4 is larger than 1.

10. The deposition method according to claim 1, wherein the RF power applied to said parallel plate type electrodes is modulated with a single frequency.

11. The deposition method according to claim 1, wherein the pressure in said reaction chamber in said deposition step is not more than 666 Pa.

12. The deposition method according to claim 1, wherein the deposition temperature in said deposition step is not more than 480 C.

13. A method of manufacturing a semiconductor device having conductive portions of Damascene structure on a substrate, comprising the steps of:

depositing fluorine—containing silicon insulating film on a substrate by generating the plasma of process gas containing SiH4, SiF4 and an oxygen source substance, said process gas being introduced into the chamber of the semiconductor manufacturing apparatus having parallel plate type electrodes; and

forming said conductive portions of Damascene structure in said silicon insulating film.

14. The method according to claim 13 wherein said Damascene step comprises the steps of:

forming depressed portions in said silicon insulating film; and

forming conductive material in said depressed portions.

15. The method according to claim 13, wherein the RF power applied to said parallel plate type electrodes is at least 1000 Watts.

16. The method according to claim 13, wherein the RF power applied to said parallel plate type electrodes is 1400 Watts or more.

17. The method according to claim 13, wherein the RF power applied to said parallel plate type electrodes is at least 4 Watts/sccm.

18. The method according to claim 13, wherein the flow rate ratio of said SiF_4 to said SiH_4 is larger than 1.

19. A deposition apparatus comprising:
parallel plate type electrodes arranged in a chamber; means for introducing process gas containing SiH_4,
SiF_4 and oxygen source substance into said chamber; and a power source for supplying RF power for generating
a plasma of said process gas, said power source being capable of supplying RF power of at least 1000 Watts to said parallel plate type electrodes.

20. The deposition apparatus according to claim 19 wherein the separation of said parallel plate type electrodes is at least 0.5 cm and not more than 1.75 cm.